

Antibiotic Prophylaxis Practices in Dentistry: A Survey of Dentists and Physicians

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ABSTRACT

Background: A survey was conducted to determine prescribing practices of general dental and medical practitioners regarding the use of antibiotics for prophylaxis.

Materials and Methods: A questionnaire with an accompanying letter was designed to investigate prescribing practices of general dentists and physicians. The survey encompassed demographic data, mechanisms to keep current with prophylactic practice, first- and second-line drugs prescribed with doses and directions, applicable medical conditions and dental procedures warranting antibiotic prophylaxis. Names were chosen randomly from provincial lists and ethics approval was granted. Responses were compared with 1997 American Heart Association (AHA) guidelines.

Results: In all, 1,500 surveys were sent to each group, with a response rate of 32% of dentists and 17% of physicians. There was a significant difference ($p < 0.05$) between dentists (95%) and physicians (71%) in selecting the correct first-line antibiotic, amoxicillin, and in choosing the correct dose of amoxicillin (i.e., 2 g, 1 hour before treatment): 88% of dentists and 48% of physicians ($p < 0.05$). Appropriate second-line drugs were correctly selected by 84% of dentists and 67% of physicians — a significant difference ($p < 0.05$) — with clindamycin chosen most often (82% and 49%, respectively). Over 90% of respondents in both professions correctly identified conditions, such as prosthetic heart valve and endocarditis, requiring antibiotic prophylaxis.

Conclusions: Clinicians are not always aware of current clinical guidelines, and dentists and physicians exhibit different patterns regarding antibiotic prescribing. Dentists are more familiar than physicians with current protocols of the AHA.

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General dental practitioners regularly prescribe antibiotics to manage oral and dental infections either therapeutically or prophylactically.¹ As studies of the need for and the effectiveness of antibiotics in the dental field continue, there is an ongoing debate over their role in prophylaxis.² Although the American Heart Association (AHA) issues recommendations, the most recent in 1997,³

the applicability of these recommendations is continually being re-evaluated. It is the responsibility of the medical and dental communities to be aware of the latest protocols and to prescribe appropriately.

Antibiotic prophylaxis was first proposed for dental treatment after infective endocarditis was found to be linked to bacteremias following dental treatment.¹ Recommendations

were later refined to specify types of high-risk patients and procedures. However, alterations to current AHA guidelines may be required, as many conditions may not require antibiotic coverage before dental treatment,⁴⁻⁷ and some procedures previously thought to require prophylaxis may not warrant coverage.^{7,8}

Although infective endocarditis is potentially devastating, it is not a direct result of dental visits,⁹ and antibiotic prophylaxis has not produced the expected decrease in cases.¹⁰ Even if all patients at risk of developing infective endocarditis were given antibiotic prophylaxis, it might only prevent 5.3% of cases.¹¹ There is a larger likelihood of bacteremias related to normal daily activities than from dental procedures¹²; therefore, some argue that the era of antibiotic prophylaxis is over.¹³

The empiric and broad use of antibiotic prophylaxis is clearly no longer acceptable, but details regarding responsible prescribing remain problematic. In the dental community, there has been a general trend toward overprescribing.¹⁴⁻¹⁶ One survey found that only 39% of dentists and 27% of physicians followed guidelines appropriately.¹⁷ Many practitioners rely on recommendations of other practitioners — who often cite anecdotal evidence — or decide that, when in doubt, the wise and conservative course is to prescribe.¹

The aim of this study was to determine the specific prescribing practices of general dentists and family physicians with regard to antibiotic prophylaxis for dental procedures.

Materials and Methods

A 1-page questionnaire with a cover letter was designed to investigate antibiotic prophylaxis prescribing practices of general dentists and family physicians in Alberta, Canada. This questionnaire, which went through numerous revisions following discussions with dentists, doctors and methodologists, was based on previously published surveys,¹⁴⁻¹⁶ AHA guidelines¹⁸ and other current literature^{6,19} in conjunction with clinical experience.

The survey was divided into 5 sections: demographic data; mechanisms by which the dentist or physician remains informed of current prophylactic practices and monthly frequency of prophylactic antibiotic prescription; first- and second-line drugs commonly prescribed, with doses and directions; medical conditions requiring antibiotic prophylaxis for invasive dental procedures; and dental procedures warranting antibiotic prophylaxis in a susceptible patient.

The questionnaire was sent to 1,500 dentists (virtually all general dentists) and 1,500 family physicians (more than half the provincial roster). Individual names and addresses were chosen randomly from membership lists supplied by the Alberta Dental Association and College and the Alberta Medical Association following ethics approval. The survey was anonymous and could be returned

in a self-addressed, prepaid envelope included with the questionnaire. Respondents were requested to avoid use of any reference materials while answering the questionnaire. There was no follow-up with nonrespondents due to the anonymity of the survey.

The 1997 AHA guidelines¹⁸ for prophylaxis regimens were used as the standard for comparison of results, as the Canadian Dental Association cited these as recommended guidelines and they remain current.²⁰ Respondents' choices based on earlier guidelines were categorized as incorrect if they were not currently accepted prophylaxis protocols. The lists of medical conditions and dental procedures requiring prophylaxis were prepared by the research team. These did not follow a single reference guide, as initial answers were formulated by the team, then verified using appropriate practice recommendations from the literature.^{6,18,19}

All drugs and regimen combinations reported by respondents were tabulated; however, results were simplified to include only the higher frequency answers; all others were combined into a single category, "other." The list of medical conditions that require antibiotic prophylaxis for invasive dental procedures is long; only the most prominent ones noted in the survey are presented. Similarly, although the survey enquired about the potential need for antibiotic prophylaxis before several other dental procedures, only a sample of responses was analyzed.

Data were coded and verified using SPSS version 11 (SPSS Inc., Chicago, Ill.) to determine descriptive statistics and compare groups using chi-square tests.

This study received ethics approval from the Human Resources Ethics Board of the faculty of medicine and dentistry of the University of Alberta.

Results

Of 3,000 surveys mailed, 103 were returned due to incorrect address or clinician no longer practising or deceased. Replies from specialists in both professions were excluded from analysis. As shown in **Table 1**, respondents included 450 (32%) general dentists with an average of 18.6 (standard deviation [SD] 9.8) years of practice and 245 family physicians (17%) with an average of 18.3 (SD 10.6) years of practice. Most dentists (97%) and physicians (93%) were in private practice (sometimes combined with hospital, university and government employment responsibilities).

The correct first-line antibiotic, amoxicillin, was chosen by 428 dentists (95%) and 175 physicians (71%) (**Table 2** and **Fig. 1**), while the correct first-line dose regimen (2 g, 1 hour before the procedure) was indicated by 88% of dentists and 48% of physicians. An incorrect drug, penicillin, was prescribed by 3% of dentists and 19% of physicians. The difference between dentists and physicians in prescribing the correct first-line antibiotic was significant ($p < 0.05$).

Table 1 Characteristics of survey respondents

	Dentists	Physicians
Surveys sent	1,500	1,500
Surveys returned undelivered	78	25
Total surveys received by participants	1,422	1,475
Survey responses from general practitioners (%)	450 (32)	245 (17)
Areas of employment		
Private practice; no. (%)	437 (97)	227 (93)
Other; no. (%)	13 (3)	18 (7)
Years in practice		
Mean; years (SD)	18.6 (9.8)	18.3 (10.6)
Range; years	0–57	0–51

Table 2 Proportion (%) of respondents prescribing first- and second-line antibiotics

	Dentists	Physicians
First-line antibiotic		
Amoxicillin ^a	95	71
Penicillin ^a	3	19
Other	2	9
Second-line antibiotic		
Clindamycin ^a	82	49
Erythromycin	10	21
Azithromycin	1	7
Clarithromycin	1	6
Cephalexin	0	5
Other	6	12

^aDifference between dentists and physicians is significant ($p < 0.05$).

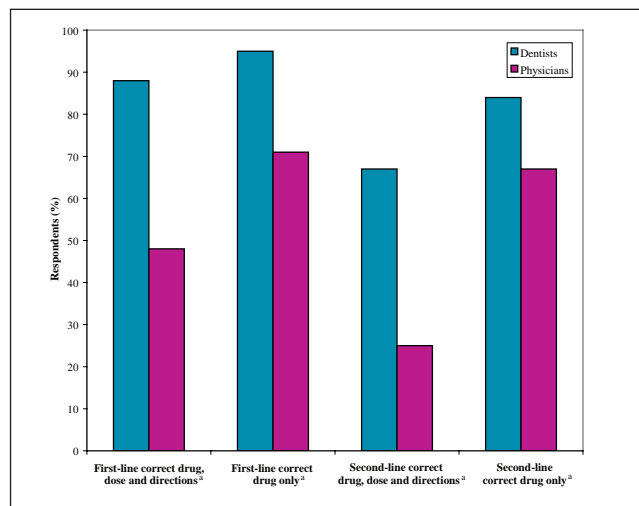


Figure 1: Drug regimens selected by respondents. Note: All differences between dentists and physicians are significant ($p < 0.05$).

^aCorrect according to American Heart Association guidelines.³

Appropriate second-line drugs, which include clindamycin, cephalexin, cefadroxil, azithromycin and clarithromycin, were correctly chosen by 84% of dentists and 67% of physicians (Table 2 and Fig. 1). Clindamycin was most often prescribed by both dentists (82%) and physicians (49%) followed by azithromycin (dentists 1%, physicians 7%), clarithromycin (dentists 1%, physicians 6%) and cephalexin (dentist 0%, physicians 5%). Correct second-line dose regimens (clindamycin 600 mg, cephalexin or cefadroxil 2 g, azithromycin or clarithromycin 500 mg, all 1 hour before treatment) were specified by 67% of dentists and 25% of physicians (significantly different, $p < 0.05$). An incorrect drug, erythromycin,

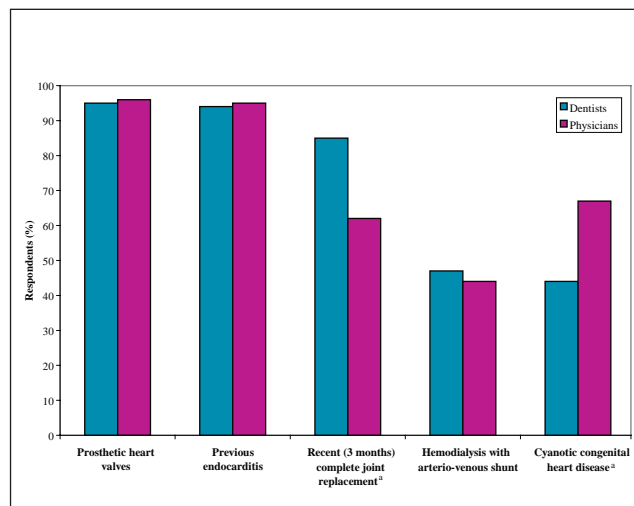


Figure 2: Medical conditions for which dentists and physicians are correctly using antibiotic prophylaxis.

^aDifference between dentists and physicians is significant ($p < 0.05$).

was specified by 10% of dentists and 21% of physicians. There was a significant difference ($p < 0.05$) between the percentages of dentists and physicians who chose clindamycin as a second-line antibiotic.

Having a prosthetic heart valve and a previous history of endocarditis were correctly identified as medical conditions requiring antibiotic prophylaxis by a large majority of dentists and physicians (Fig. 2). Only in terms of prophylaxis for those with recent joint replacement and cyanotic congenital heart disease, were there significant differences between dentists and physicians ($p < 0.05$).

Six dental procedures requiring antibiotic prophylaxis in medically susceptible people were selected from a long list (Fig. 3). Differences between dentists and physicians

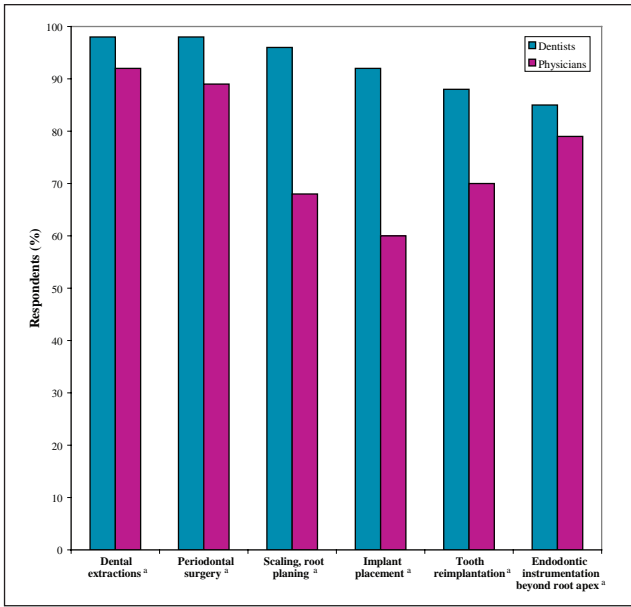


Figure 3: Dental procedures for which antibiotic prophylaxis is used.
^aDifference between dentists and physicians is significant ($p < 0.05$).

in correctly identifying these procedures as requiring prophylaxis were significant ($p < 0.05$).

When dentists and physicians who had been in practice for 20 years or more were compared with those in practice for less than 20 years, both groups had the same selection pattern, with similar significant differences between dentists and physicians in both groups. Comparisons were also made between more-experienced dentists and physicians and less-experienced dentists and physicians in selection of antibiotic use. There were no significant differences in choices between either the more-experienced or less-experienced professional groups.

Discussion

In an era of growing concern over the use and misuse of antibiotics, more focus is placed on the specifics of antibiotic prophylaxis. Although prevention of infection is important, it must be balanced against the expanding problem of antibiotic resistance²¹ and side effects of excessive antibiotic use.²² Although guidelines are frequently updated and recommendations constantly made, these are ineffective if practitioners are not keeping abreast of them. Our study is a comparison of dentists and physicians practising in the province of Alberta with respect to their knowledge and application of currently accepted guidelines on antibiotic prophylaxis for dental treatments. This is the largest study of its kind reported in Canada and the first to consider prophylaxis practices of both physicians and dentists. Of 3,000 surveys mailed, 780 (26%) were completed and returned by members of the 2 professions. The reasonable response rate may be attributed to the simplicity of the 1-page questionnaire

and provision of self-addressed envelopes with prepaid postage as well as the importance of the topic. Although a larger response rate would have been preferable, other professional bodies report similar levels of response to surveys (personal communication, Dr. T. Theman, College of Physicians and Surgeons of Alberta, and Dr. Anthony Russell, past council member of the College). The response rate among dentists, the primary group of focus, was typical and, given the fact that nearly all general dentists were surveyed rather than just a sample, the large number of responses was helpful in the analysis. However, any response rate less than the maximum possible limits the generalizability of the conclusions.

The response rate of dentists was significantly higher than that of physicians. This might indicate that the survey topic was more interesting or important to dentists, that the use of dental terms made dentists more comfortable with the survey or that, because the survey was initiated by dental practitioners, dentists felt more obligated to respond.

Some of those who chose not to return the survey might have felt that they were not sufficiently aware of current prophylaxis recommendations; this could have affected the validity of the results. Although we asked respondents not to consult reference material before answering the survey, there is no guarantee this was the case. In addition, there is no assurance that what practitioners reported in their survey responses corresponds with what they do on a day-to-day basis in their practices. However, as there was seemingly no incentive to respond dishonestly to an anonymous survey, one would assume that professional practitioners would be as truthful as possible. The average number of years since graduation was similar for both professions, which strengthened comparisons.

Many dentists consult physicians regarding the need for prophylaxis and application of current regimens before performing dental procedures.²³ It is necessary to ensure that practising dentists and physicians remain current to avoid development of potentially avoidable sequelae (infective endocarditis) or development of drug resistance due to inaccurate prescribing habits. Our results show considerable differences between dentists and physicians in terms of drug prescription and regimens advised, as well as medical conditions and dental procedures requiring antibiotic prophylaxis. The topic may be more relevant to dentists as it pertains to their everyday procedures, requiring them to be more informed. Just as the typical dentist would not be aware of the specifics of physicians' procedures, a physician cannot be faulted for not knowing specifics of dental procedures, and thus their antibiotic prophylaxis needs.

It is essential, when prescribing any medication, to be aware of the proper drug and dosing regimen to ensure proper patient care. The correct prescribing of

first- and second-line agents by dentists differed significantly from prescribing patterns of physicians. Although our results seem to indicate a better understanding and recall of antibiotic prophylaxis regimens by both dentists and physicians than in previous studies,^{14,15,17} they are far from ideal. In all situations, dentists were more familiar with current antibiotic guidelines for medically susceptible patients. Dentists were also more aware of appropriate drug regimens. Both dentists and physicians demonstrated a better understanding of first-line compared with second-line antibiotic regimens. Less than a quarter of physicians properly prescribe a second-line agent with an appropriate dosing regimen. Data indicated that numerous members of both professions are prescribing according to earlier (1990) AHA guidelines.²⁴

Regarding medical conditions for which prophylaxis is required, dentists are more familiar with current guidelines on dental prophylaxis than physicians. Many dentists and physicians may need to consult appropriate references when faced with a medically compromised patient to determine the potential need for antibiotic prophylaxis and ensure responsible treatment.

Debates have developed over the need for preventive antibiotics in patients with several different medical conditions including diabetes,⁴ systemic lupus erythematosus,²⁵ coronary artery stents⁵ and end-stage renal disease.⁶ Other studies have focused on specific dental procedures and their inherent risk of causing infective endocarditis, with questions raised about such procedures as local anesthetic administration,²⁶ orthodontic banding²⁷ and periodontal probing.²⁸ Studies are continually refining recommendations for prophylaxis, putting further pressure on practitioners to keep up with the literature to ensure proper treatment.

Dentists appear to have a better knowledge of when to prescribe antibiotics for at-risk patients undergoing invasive dental procedures. A significantly greater percentage of dentists than physicians answered correctly in all procedure areas. For example, scaling and root planing, a common procedure in dentistry, requires prophylaxis due to invasiveness and the potential to cause substantial bleeding; however, more than 30% of physicians are unaware of the need for antibiotics before this procedure. Similarly, dental implants, now a mainstay in dentistry, require antibiotic prophylaxis for their placement, but 40% of physicians are unaware of this fact.

Results of this survey may point to the need to examine overprescription practices for certain medical conditions and dental procedures as well as potential creation of antibiotic resistant strains of bacteria. Future work could explore differences in properly prescribing prophylactic antibiotics between specialists and generalists within each profession.

Conclusions

Dentists and physicians are not always aware of the most current clinical guidelines regarding antibiotic prophylaxis, even though guidelines are widely available. Dentists and physicians exhibit varying levels of understanding of antibiotic prophylaxis prescribing with a tendency for dentists to be more correct in their evaluations. All clinicians should make themselves aware of current guidelines available for antibiotic prophylaxis to ensure the highest degree of patient care. ♦

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